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(54) ELASTIC BANDAGE

(71) We, MOLINIER S.A. a French company of chemin du Siccard, Veauche, Loire, France, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to an elastic bandage.

According to a first aspect of the invention, there is provided an elastic bandage which comprises a mesh structure built up from elastic filaments or threads extending in the longitudinal direction which are joined with substantially inextensible filaments or threads extending in the transverse direction, the mesh structure additionally including substantially inextensible filaments or threads extending in the longitudinal direction, the bandage having been produced with the elastic filaments or threads in a tensioned state whereby on relaxation of the bandage the elastic filaments or threads have contracted and the longitudinally extending substantially inextensible filaments or threads have relaxed to such an extent that they have adopted a looped configuration.

According to a second aspect of this invention, there is provided a method for the production of an elastic bandage, which comprises disposing parallel to one another and in the longitudinal direction filaments or threads some of which are elastic and are stretched and some of which are substantially inextensible, connecting together said filaments or threads by means of substantially inextensible filaments or threads extending therebetween and joined therewith, whereby there is produced a tensioned fabric which includes substantially inextensible filaments or threads extending in the longitudinal direction and relaxing the tension in the fabric whereby the elastic filaments or threads contract and the longitudinally extending substantially

inextensible filaments or threads adopt a looped configuration.

Although various modes of joining together the longitudinally and the transversely extending filaments or threads, for example as in a knotted structure, preferred bandages according to this invention possess a knitted structure.

The contraction of the elastic filaments or threads at the end of the manufacture of the bandage imparts to the bandage a bulked effect resulting from the looping of the longitudinally extending substantially inextensible filaments or threads. This substantially enhances the absorptive capacity of the bandage while not detracting from the elastic properties of the bandage. The construction of the bandage is such that longitudinal extension of the bandage does not result in any retraction in the transverse direction.

The elastic filaments or threads which impart to the bandage these desirable properties can be of a number of types. For example, filaments or threads formed of foamed synthetic plastics material such as polyamide foam or superpolyamide foam can be employed. Such filaments or threads have the particular advantage that they can be usefully employed at the selvedge of the bandage. The fact that foam filaments or threads may not have particularly high mechanical strength is not critical since the overall strength of the bandage can be in the longitudinally extending substantially inextensible filaments or threads which are used.

It is also possible to form the elastic filaments of natural or synthetic rubber, rubber plastics or even spandex fibres such as those available under the Registered Trade Mark "Lycra". A further type of filament or thread which can be used to impart to the bandage the desired properties is a bulked filament or thread produced by crimping in any suitable manner a filament or thread formed of a normally inextensible

material, for example a filament or thread formed of cotton. Such crimping can be obtained with cotton filaments or threads by applying a supertwist to the filaments or threads, untwisting the filaments or threads and then fixing or setting the crimping which has been obtained in the filaments or threads. Thus, when such filaments or threads are used, they will be stretched during the formation of the bandage and then released to assume their crimped conformation in order that at the same time the longitudinally extending inextensible filaments or threads will achieve their looped conformation. Use of such an elastic material has the advantage of imparting further absorptive properties to the bandage. Irrespective of whether or not such bulked filaments or threads are employed to provide the necessary retraction of the knitted elastic bandage, such bulked filaments or threads can be interwoven with the transversely extending substantially inextensible filaments or threads to impart their desirable moisture absorptive properties to the bandage.

The disposition of the different types of longitudinally extending filaments or threads with respect to each other is not critical. They can alternate or they can be randomly disposed.

For a better understanding of the invention, and to show how the same can be carried into effect, reference will now be made, by way of example only, to the accompanying drawing, in which:

Figure 1 is a perspective view of a first form of knitted bandage according to the invention in its longitudinally extended state immediately following manufacture;

Figure 2 is a view similar to that shown in Figure 1 of the bandage of Figure 1 following elastic retraction thereof;

Figure 3 is a view similar to that shown in Figure 2 of an alternative form of bandage; and

Figure 4 is a view similar to that shown in either of Figures 2 and 3 of a further form of bandage according to the present invention.

Referring to Figures 1 and 2, the illustrated bandage comprises elastic threads 1 and inextensible threads 3 extending alternately in the longitudinal direction, although such regular alternation is not essential and the threads 1 and 3 can be randomly disposed. A number of inextensible filaments 2 each of which shuttles back and forth between adjacent threads 1 and 3 to each of which they are joined by knitting at pairs of longitudinally spaced apart positions, being the positions at which they arrive from an adjacent thread 1 or 3 and the positions at which they depart for said adjacent thread, provide the only transverse links in the mesh structure ob-

tained. The selvages of the bandage are however constituted in the embodiment illustrated by synthetic elastic threads and this is of particular value especially when the elastic threads are formed of foamed synthetic plastics material, for example polyamide or superpolyamide foam.

In Figure 1, the elastic threads 1 are in a tensioned state and the threads 3 are in the straight configuration which results from their disposition parallel to the elastic filaments with the support structure of filaments 2 formed therearound. In Figure 2, the tension in the elastic filaments has been released, thus causing longitudinal contraction of the bandage. Regularly spaced apart notional positions on the threads 2 and 3 are shown by circles. Thus the elastic threads 1 remain straight, but untensioned, as their notional positions have been drawn closer together, while the threads 3 have become relaxed and tangled up with formation of loops or chainettes as their notional positions have become superimposed. Similar looping of the longitudinally extending portions of the filaments 2 has occurred.

The inextensible filaments and threads present in the bandage can be formed of cotton. As an alternative to forming the elastic or extensible filaments of foam, they can be formed of natural or synthetic rubber, rubber plastics or spandex fibre, in particular "Lycra". Examples of suitable elastic threads are those disclosed in our French Patent No. 1,350,542.

As a result of the looping of the extensible threads 3, the absorptive capacity of the bandage is considerably improved. The bandage becomes denser and warmer owing to its increased bulk, while having an excellent capacity for strengthening lengthwise. Hence the bandage is particularly well suited for use in medicine and surgery. By varying the number of extensible threads 1 with respect to the number of extensible threads 3, the particular qualities which it may be desired to emphasise in the bandage can be achieved.

Thus referring next to Figure 3 in which there is shown a bandage having a similar construction to that shown in Figures 1 and 2, in this case all the solely longitudinally extending threads, which are here given the reference numeral 4, are formed of natural or synthetic rubber, rubber plastic or spandex fibre. Once again the filaments 2 shuttle back and forth between parallel threads 4 to which they are joined by knitting and it is the longitudinally extending portions of the filaments 2 which undergo chainette-formation when the bandage is relaxed after knitting thereof which provide the required bulked effect.

Finally, referring to Figure 4, a similar

type of structure to that shown in Figure 3 is illustrated in which bulked threads 5 are inserted lengthwise between longitudinally extending elastic filaments 4 to which the longitudinally extending portions of filaments 2 are joined by knitting. The threads 5 will be formed, for example of cotton and will have been bulked before use by subjecting them to super-twisting followed by untwisting and then fixing of the crimps obtained in such a way as to preserve the crimps, thus imparting a type of elasticity to the threads 5. The bulking of the threads 5 in the relaxed bandage will thus augment the bulking of the chainette portions of the filaments 2.

In the bandage shown in Figure 4 the threads 5 alternate with the extensible threads 4, and the threads 5 are simply woven above and below the transverse portions of the filaments 2. The form of bandage shown in Figure 4 can, however, be modified when using bulked threads of sufficient elasticity by using such threads in place of some or all of the elastic threads 1 so that the filaments 2 become joined thereto.

The types of knitted bandage in which the bulked threads are used have the particular advantage of improved absorptive capacity. The bandage is thick and has a particularly bulky appearance.

Although in the foregoing description, reference has been made to the imparting of bulk to the bandage by the looping of longitudinally extending inextensible filaments, it is pointed out that bulk can also be imparted to the bandage to some extent by the relaxing of the relaxed elastic filaments, especially when bulked filaments or threads formed of intrinsically inextensible material are used at least, in part, as the elastic material.

WHAT WE CLAIM IS:—

1. An elastic bandage which comprises a mesh structure built up from elastic filaments or threads extending in the longitudinal direction which are joined with substantially inextensible filaments or threads extending in the transverse direction, the mesh structure additionally including substantially inextensible filaments or threads extending in the longitudinal direction, the bandage having been produced with the elastic filaments or threads in a tensioned state whereby on relaxation of the bandage the elastic filaments or threads have contracted and the longitudinally extending substantially inextensible filaments or threads have relaxed to such an extent that they have adopted a looped configuration.

2. A bandage as claimed in Claim 1, in which the elastic filaments or threads are

formed of foamed synthetic plastics material.

3. A bandage as claimed in Claim 2, in which the elastic filaments or threads are formed of polyamide or superpolyamide foam.

4. A bandage as claimed in Claim 2 or 3, in which the foam filaments or threads lie along the selvedge of the bandage.

5. A bandage as claimed in Claim 1, in which the elastic filaments or threads are formed of natural or synthetic rubber, rubber plastics or spandex fibre.

6. A bandage as claimed in any one of the preceding claims, in which the elastic filaments or threads are constituted in part at least by bulked substantially inextensible material.

7. A bandage as claimed in any one of the preceding claims, in which the filaments or threads extending in the longitudinal direction are joined to the filaments or threads extending in a transverse direction in a knitted structure.

8. A bandage as claimed in any one of the preceding claims, which further comprises filaments or threads constituted by bulked substantially inextensible material interwoven with the transverse filaments or threads.

9. A bandage as claimed in Claim 6, 7 or 8, in which the bulked material is cotton.

10. A bandage as claimed in Claim 6, 7, 8 or 9, in which the filaments or threads of bulked material have been produced by super-twisting cotton filaments or threads, untwisting the filaments or threads and fixing crimps produced in the untwisted filaments or threads.

11. A bandage as claimed in any one of the preceding claims, in which the longitudinally extending inextensible filaments or threads are formed of cotton.

12. A bandage as claimed in any one of the preceding claims, which comprises elastic filaments or threads joined with transversely extending inextensible filaments or threads and alternating with inextensible filaments or threads joined with said transversely extending filaments or threads and extending only in the longitudinal direction between positions at which they are joined to the transversely extending filament or threads.

13. A bandage as claimed in any one of the preceding claims, in which a single substantially inextensible filament or thread connects together each adjacent pair of longitudinally extending filaments or threads, which substantially inextensible filament or thread shuttles back and forth between each filament or thread of said pair, thereby constituting said transversely extending filaments or threads, and is joined to each of said pair of longitudinally ex-

tending filaments at pairs of longitudinally spaced apart positions between which the substantially inextensible filaments or threads are disposed in the longitudinal direction of the bandage.

14. A bandage as claimed in Claim 13 when appendant to any one of Claims 1 to 11, in which each member of each said pairs of filaments or threads is an elastic filament or thread and the longitudinally extending portions of the substantially inextensible filaments or threads are the sole source of the looped filament or thread configuration when the bandage is relaxed.

15. A bandage as claimed in any one of the preceding claims, in which the transversely extending filaments or threads are formed of cotton and, in being joined to solely longitudinally extending filaments or threads, constitute the only connection between adjacent solely longitudinally extending filaments or threads.

16. An elastic bandage substantially as hereinbefore described with reference to, and as shown in, Figures 1 and 2, Figure 3 or Figure 4 of the accompanying drawings.

17. A method for the production of an elastic bandage, which comprises disposing parallel to one another and in the longitudinal direction filaments or threads some of which are elastic and are stretched and some of which are substantially inextensible connecting together said filaments or threads by means of substantially inextensible filaments or threads extending therebetween and joined therewith, whereby there is produced a tensioned fabric which includes substantially inextensible filaments or threads extending in the longitudinal direction and relaxing the tension in the fabric whereby the elastic filaments or threads contract and the longitudinally extending substantially inextensible filaments or threads adopt a looped configuration.

18. A method as claimed in Claim 17, in which said filament or threads extending in the longitudinal direction are joined to the filaments or threads extending therebetween in a knitted structure.

19. A method as claimed in Claim 17 or 18, in which substantially inextensible filaments or threads extending continuously

in the longitudinal direction and elastic filaments or threads are alternately disposed parallel to each other.

20. A method as claimed in Claim 17, 18 or 19, in which single substantially inextensible filaments or threads are used to connect together each adjacent pair of said parallel filaments or threads, which substantially inextensible filaments or threads shuttle back and forth between each filament or thread of each pair, thereby constituting said transversely extending filaments or threads, and are joined to each member of each pair of longitudinally extending filaments or threads at pairs of longitudinally spaced apart positions between which the substantially inextensible filaments or threads are disposed in the longitudinal direction of the fabric.

21. A method as claimed in Claim 20, when appendant to Claim 17 or 18, in which all the filaments or threads disposed parallel to one another are elastic and the portions of the substantially inextensible filaments or threads disposed in the longitudinal direction of the fabric provide said looped filament or thread configuration.

22. A method as claimed in any one of Claims 17 to 21, which further comprises the steps of interweaving with the substantially inextensible filaments or threads connecting said filaments or threads disposed parallel to each other, filaments or threads constituted by bulked substantially inextensible material.

23. A method for the production of an elastic bandage, substantially as hereinbefore described with reference to Figures 1 and 2, Figure 3 or Figure 4 of the accompanying drawings.

24. An elastic bandage, whenever produced by the method claimed in any one of Claims 17 to 23.

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